

Date: June 30, 1997

## PROGRESS REPORT

on the Project  
Automatic Target Recognition (N94-124)

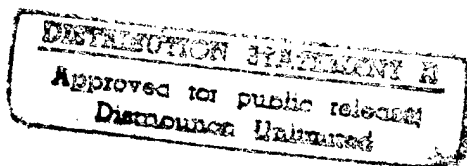
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Phase II

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19970910 123

# AUTOMATIC TARGET RECOGNITION (SBIR N94-124)

## TASK D2.a REPORT (June 30, 1997)

### Construction of A Digital Signature Database

#### Executive Summary

Under Task D2.a, our major responsibility is to construct a digital signature database, which will be used in Task D2.b for signature recognition based on elastic matching of the stochastically deformable wavelet template (SDWT). We have built a signature database consisting 100 representative English names. A hard copy of these signatures is included in this report, and the digital signature files are also stored in a CD-ROM for reproduction and/or retrieval.

#### 1 Procedure for Digital Signature Database Construction

The procedure of building the signature database is described below.

- Step 1. Signature Table Design

First, we design a signature table which contains a title and 27 signature fields. Each table is printed on two pages of size  $8.5 \times 11$ . Page one contains the title and Item #1 to #12, and Page two contains Item #13 to #27. The title is an English name randomly selected from the dictionary. Signature items are arranged in a  $3 \times 9$  array.

The array can be divided into two parts. the first part consists of Row 1 to Row 7 with authentic signatures while the second part consists of Rows 8 and 9 with forged signatures. In Part one, Item 1 to Item 9 are for signatures without underlines or enclosing boxes, Item 10 to Item 15 are signatures with underlines, and Item 16 to Item 18 are signatures with enclosing boxes. In Part two, Row 8 is the forged signatures without the knowledge of the true signature while Row 9 is the forged signature by imitating the authentic signature.

- Step 2. Signature Collection

One hundred signature tables were given to 100 people. Each person signed Item 1 to Item 21. He was also responsible for finding someone to sign Item 22 to Item 27.

- Step 3. Converting Signature Tables into Images

An AGFA scanner was used to scan the above 100 signature tables into images. After trying different image resolutions to get the best trade-off between the image quality and the image storage requirement, we chose 150 DPI resolution for scanning. Then, signature tables were converted into gray-level images of size  $2224 \times 2742$ .

- Step 4. Signature Image Post-processing

Three tasks were performed in this step. The first task is to transform gray-level signature images into binary images. Thresholding based on local intensity is used for image binarization. The second task is to eliminate item numbers on the signature images using image

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